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NOT TO SCALE



CHARLOTTE-MECKLENBURG
 STORM WATER SERVICES
 GENERIC DETAIL REQUIREMENTS

BOULDER VANE
 DRAFT - NOT TO BE USED FOR CONSTRUCTION

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NOTES:

1. A BOULDER VANE IS A STREAM BANK PROTECTION, IN-STREAM STRUCTURE THAT DIRECTS STREAM FLOW AWAY FROM THE STREAM BANK AND IN TOWARD THE CENTER OF THE CHANNEL. THE DETAIL SHALL BE "FLIPPED" DEPENDING ON WHICH STREAM BANK (LEFT OR RIGHT) IS ON THE OUTSIDE OF THE MEANDER BEND.
2. A POOL ELEVATION CONTROL POINT OR EXCAVATION TO A SPECIFIED MAXIMUM POOL DEPTH SHALL BE DESIGNATED TO ESTABLISH PART OF THE PROFILE. SURVEY OF CONTROL POINTS SHALL BE REQUIRED TO ESTABLISH ACCURATE BOULDER VANE INSTALLATION WITHIN THE TOLERANCE SPECIFIED BY THE DESIGNER.
3. THE VANE SHALL INTERCEPT THE STREAM BANK AT A HEIGHT EQUAL TO BETWEEN 1/2 BANKFULL STAGE AND BANKFULL STAGE. AN ELEVATION CONTROL POINT MAY BE ESTABLISHED AT THE LEFT OR RIGHT STREAM BANK/VANE INTERCEPT POINT. THE VANE INTERCEPT LOCATION MAY BE OTHERWISE DESCRIBED BY ITS RELATIONSHIP TO BANKFULL STAGE OR BY THE LENGTH AND SLOPE OF THE VANE ARM. BANKFULL IS NOT NECESSARILY THE TOP OF THE STREAM BANK SLOPE.
4. IF PLANS DESIGNATE THE USE OF MULTIPLE BOULDER VANES A TABLE OF ALL STATION LOCATIONS AND CONTROL POINT ELEVATIONS SHALL BE PROVIDED IN THIS DETAIL OR PROVIDED ELSEWHERE IN THE PLANS AND REFERENCED HEREIN.
5. A TYPICAL CROSS SECTION SHALL BE PROVIDED ELSEWHERE IN THE PLANS TO ESTABLISH THE DIMENSIONS OF THE CHANNEL GRADING INTO WHICH THE BOULDER VANES ARE TO BE INSTALLED.
6. BOULDER VANES SHALL BE CONSTRUCTED OF FLAT-SIDED BOULDERS OF A SIZE (LENGTH, WIDTH, AND DEPTH) SPECIFIED BY THE DESIGNER.
7. FILTER FABRIC OF A TYPE AND SIZE SPECIFIED BY THE DESIGNER SHALL BE USED TO SEAL THE GAPS BETWEEN THE BOULDERS AND UNDER THE COARSE BACKFILL MATERIAL OF THE VANE. THERE SHALL BE NO FILTER FABRIC VISIBLE IN THE FINISHED WORK; EDGES SHALL BE FOLDED, TUCKED, OR TRIMMED AS NEEDED.
8. COARSE BACKFILL OF THE BOULDER VANE SHALL BE OF A TYPE, SIZE, AND GRADATION AS SPECIFIED BY THE DESIGNER. COARSE BACKFILL SHALL BE PLACED TO A THICKNESS EQUAL TO THE DEPTH OF THE HEADER AND FOOTER BOULDERS AND SHALL EXTEND OUT FROM THE VANE TO THE STREAM BANK.
9. BOULDER VANES SHALL BE BUILT TYPICALLY AS FOLLOWS:
 - A. OVER-EXCAVATE STREAM BED TO A DEPTH EQUAL TO THE TOTAL THICKNESS OF THE HEADER AND FOOTER BOULDERS.
 - B. PLACE FOOTER BOULDERS OF VANE AND FLOODPLAIN SILL.
 - C. INSTALL FILTER FABRIC OVER FOOTERS OF VANE.
 - D. PLACE COARSE BACKFILL ON FILTER FABRIC AND UP TO THE TOP OF THE FOOTER BOULDERS. ALSO PLACE BEHIND FLOODPLAIN SILL FOOTERS.
 - E. INSTALL HEADER BOULDERS ON TOP OF AND SET SLIGHTLY BACK FROM THE FOOTER BOULDERS. THE FILTER FABRIC WILL BE SECURED BETWEEN THE HEADER AND FOOTER BOULDERS OF THE VANE. THE SLOPE OF THE VANE ARM IS MEASURED ALONG THE VANE ARM WHICH IS INSTALLED AT AN ANGLE TO THE STREAM BANK AND PROFILE.
 - F. PLACE REMAINING COARSE BACKFILL BEHIND HEADER BOULDERS OF THE VANE OVER TO THE STREAM BANK, ENSURING THAT ANY VOIDS BETWEEN THE BOULDERS ARE FILLED.
 - G. BACKFILL REMAINDER OF VANE AND FLOODPLAIN SILL WITH PREVIOUSLY EXCAVATED MATERIAL.
10. IF ANY EROSION CONTROL MATTING IS SPECIFIED FOR USE IN THE VICINITY OF THE STREAM BANK/VANE INTERCEPT POINT THE MATTING EDGES SHALL BE NEATLY SECURED AROUND THE BOULDERS.

DIMENSIONS (VALUES TO BE PROVIDED BY DESIGNER)			
VARIABLE	VALUES	TYPICAL UNIT	DESCRIPTION
X1		FT. (NAVD)	LEFT OR RIGHT BOULDER VANE BANK INTERCEPT CONTROL POINT ELEVATION
X2		FT. (NAVD)	POOL CONTROL POINT ELEVATION
X3		FT.	BANKFULL WIDTH
X4		FT.	VANE ARM LENGTH
X5		FT.	LENGTH OF FLOODPLAIN SILL
X6		DEGREES	VANE ANGLE WITH STREAM BANK
X7		IN. OR FT.	DIFFERENCE BETWEEN TOP OF BANK (BANKFULL) AND VANE ARM INTERCEPT POINT
X8		PERCENT	VANE ARM SLOPE
X9		IN. OR FT.	BOULDER LENGTH
X10		IN. OR FT.	BOULDER WIDTH
X11		IN. OR FT.	BOULDER THICKNESS
X12		IN.	D50 OF COARSE BACKFILL
X13		IN.	BOULDER PLACEMENT OFFSET
X14		FT.	MAXIMUM POOL DEPTH
X15		IN.	HEADER BOULDER SETBACK

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